National Weather Service Summer 2012 Outlook

For Southwest Lower Michigan

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Forecast Overview

*The official National Weather Service long range **temperature** forecast from the Climate Prediction Center (CPC) for Southwest Lower Michigan, for the summer period (June through August, indicates there is a 33% chance temperature to be above normal category, a 34% chance for it to be in the near normal category and 33% chance for it to be in the below normal category (Fig.1).*

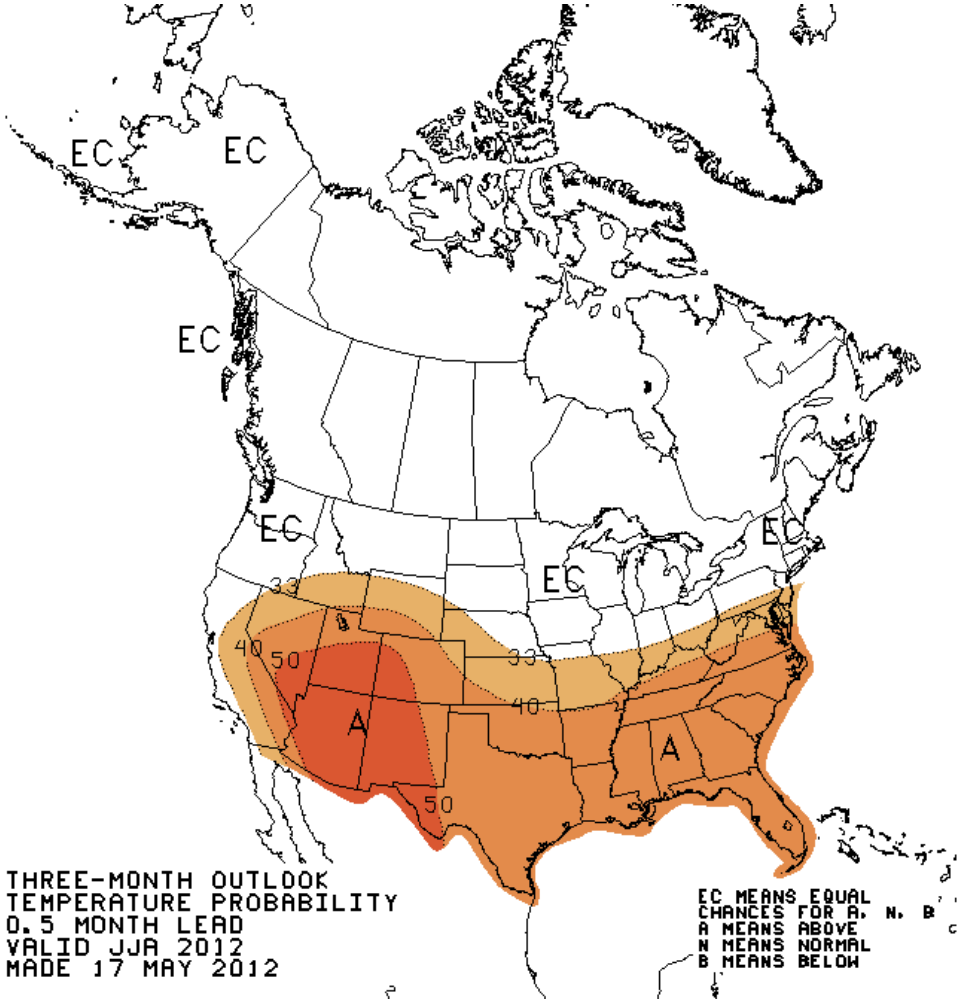

Fig. 1. The CPC temperature forecast June through August 2012 temperature anomaly.

*The CPC long range **precipitation** forecast for Southwest Lower Michigan for June through August gives a 33% chance for the precipitation to be in the above normal category, a 34% chance for it to be in the near normal category and a 33% chance for it to be in the below normal category (Fig.2).*

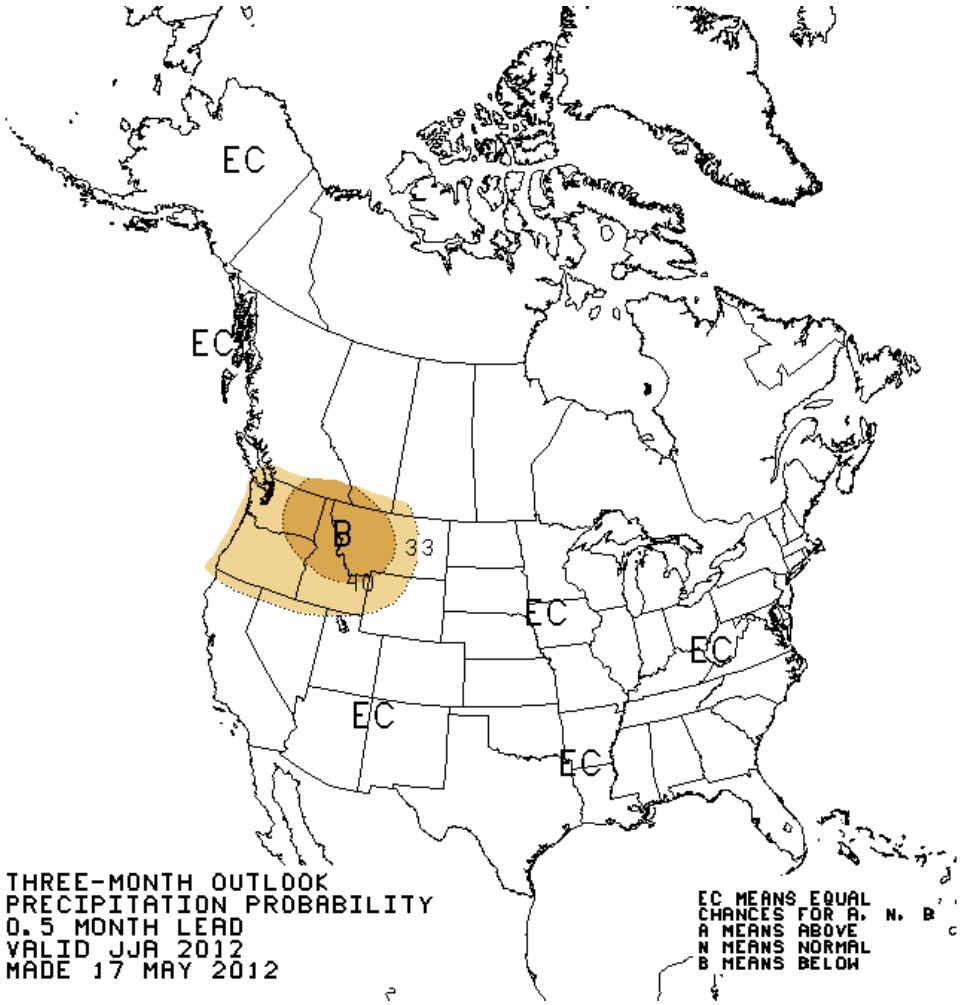

Fig. 2. The CPC precipitation probability forecast for summer (June-August 2012)

Normals

Normal temperatures are calculated averages from the 30-year period of record from 1981 to 2010. Table 1 lists normal values of temperature and precipitation for the summer months of July through September for Grand Rapids, Lansing, and Muskegon.

TABLE 1. The normals listed below are for June through August and are based on the years 1981 to 2010. All temperatures are in degrees Fahrenheit.

	Grand Rapids	Muskegon	Lansing
Average High Temperature	**81**	**78**	**80**
Average Low Temperature	**60**	**60**	**59**
Mean Temperature	**71**	**69**	**70**
# of days with High above 89 F	**8.4**	**1.8**	**7.0**
Precipitation (inches)	**11.14**	**8.31**	**9.52**

Forecast Reasoning

The forecast for this summer is primarily based on the interaction of ENSO (El Niño-Southern Oscillation) with the polar jet stream, whose dominant position affects the weather patterns over Southwest Lower Michigan. Beside the ENSO factor, the persistence of seasonal trends is strongly considered in these forecasts as were the dynamical models and soil moisture anomalies. This summer is a special case in that ENSO is going from a winter La Niña to neutral for the early summer and may become a weak El Niño by late summer or early fall.

Temperature

A weak La Niña prevailed through the winter months of 2012, but as of mid-May, ENSO has become neutral. Typically 60% of summers in Southwest Michigan are cooler than normal when La Niña winter proceeds to neutral or an El Niño (Table 2) by the summer. For this scenario, as far as our records go back, there has never been a warmer than normal summer.

The suggestion of a cold summer, based on the La Niña to neutral or El Niño concept, is mitigated by the persistence of warm temperatures from the winter through the spring. In past years when both the winter and spring remained warmer than normal, as it has this year, the summer that followed was warmer than normal 50% of the time. Only 10% of those summers were colder than normal.

Another mitigation of the cold summer idea comes from the persistence of a positive Arctic Oscillation (AO) that prevailed through the winter and spring. Typically if the AO remains positive during the summer, anomalously warm temperatures prevailed through the summer 41% of the time and cold summers occurred only 27% of the time (Table 2).

The various climate models run by CPC show the temperature to be near normal this summer over Michigan. Forecasts are shown only for areas in which the model has shown statistically significant skill. This includes Southwest Lower Michigan.

Factoring all this together, the various scenarios and model forecasts cancel each other. Therefore the forecast is for Equal Chances (EC) of above, near, and below normal temperatures this summer.

TABLE 2. The outcomes for Southwest Lower Michigan for various summer weather regimes.

Summer Temperature Outcome in Southwest Michigan			
Temperature Anomaly	**La Niña to Neutral**	**Warm Winter/Springs**	**Positive AO**
Cold Rules	**60%**	10%	27%
Warm Rules	0%	**50%**	**41%**
Near Normal	40%	30%	32%

Precipitation

The winter pattern transitioned from La Niña to neutral for the early summer and may become a weak El Niño by late summer or early fall. Mixed results are shown for the precipitation outcome (Table 3). There seems to be no clear preferred outcome. Near normal seems to have the highest frequency.

If there were a negative AO, a wet summer seems would be most likely with a 50% frequency (Table 3). Dry summers happen only 13% of the time. If the AO were to stay positive, the dry summer outcome is most likely.

The various climate models used by CPC all show either no skill over Southwest Lower Michigan, or a near normal outcome for where skill is shown.

Putting this all together, the forecast is for Equal Chances (EC) of above, near, and below normal precipitation this summer.

TABLE 3. Composite analysis for spring and summer precipitation for Southwest Lower Michigan based on a moderate La Niña during the winter fading to neutral by mid-summer.

Summer Precipitation Outcome			
Temperature Anomaly	**La Niña to Neutral**	**Negative AO**	**Positive AO**
Wet Summer	30%	**50%**	7%
Normal	**40%**	**38%**	**40%**
Dry Summer	20%	13%	**53%**

Summary

When all of these influences are considered together for Southwest Lower Michigan, the resulting forecast calls for both temperatures and precipitation this summer to most likely be near normal because there are no strong indications that temperatures or precipitation will be either below or above normal.

USEFUL WEB LINKS ON LONG RANGE FORECASTING:

Three month downscaled outlooks for selected cities in Southwest Lower Michigan:
http://www.weather.gov/climate/calendar_outlook.php?wfo=grr

The Climate Prediction Center's (CPC's) forecast:
http://www.cpc.ncep.noaa.gov/products/predictions/90day/

Additional information about past and current climate conditions:
http://www.cpc.ncep.noaa.gov/products/predictions/90day/tools/briefing/

Other CPC forecasts:
http://www.cpc.ncep.noaa.gov/products/predictions/

CPC's ENSO page:
http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/

Additional ENSO information:
http://www.pmel.noaa.gov/tao/elNiño/Niño-home.html

Information on the PDO:
http://www.wrh.noaa.gov/fgz/science/pdo.php

Information on the AMO:
http://www.aoml.noaa.gov/phod/amo_faq.php

Persistent Patterns that Shape Weather and Climate Variability- a glossary for them:
http://www2.ucar.edu/news/backgrounders/arctic-oscillation-pineapple-express-weather-maker-glossary